REMARKS

Claims 1, 8, 11, 13 and 15 have been amended and Claims 2, 3, 7, 9, 10, 12, 14 and 16. Claims 1, 4-6, 8, 11, 13 and 15 still remain pending in this application.

I. Specification

The minor errors pointed out by the Examiner have been corrected by amendment to the specification, as indicated above. The remainder of the specification has been checked and no other errors have been found.

II. Drawings

Applicants have noted the objection to Figs. 7-10 due to the improper hatching. It appears that such a minor objection does not affect the Examiner's ability to examine the instant application. Therefore, upon allowance of the application, Applicants will make the requested changes to the hatching in Figs. 7-10.

III. Claim Rejections under Section 112

Claims 1-10 stand rejected as being indefinite because Claim 1 recited "capable of electronically coupling..." and the term "about". In accordance with the Examiner's suggestions, Claim 1 has been amended to be definite and clear pursuant to Section 112. Therefore, Applicants request that the rejection of Claims 1-10 under Section 112 be withdrawn.

IV. Rejection of Claims 1, 4-6 under Section 102

Claims 1, 4-6 stand rejected under Section 102 as being anticipated by U.S. Patent No. 6,027,256, issued to Nightingale et al. The office action states that Nightingale et al. reads on the claimed invention because it teaches a heat

generating component mounted in a thermally conductive housing where heat from the component dissipates through the housing.

Applicant has amended Claim 1 to require that the housing be of a net-shape injection moldable polymer composition with a base matrix of liquid crystal polymer loaded with thermally conductive filler material with the housing having a thermal conductivity of at least 30 W/m°K. Nightingale et al. teaches a metallic welded box at the housing. In paragraph 8 of the office action, it is admitted that Nightingale et al. does not teach such an injection moldable thermally conductive polymer material. Therefore, in light of the amendments to Claim 1, Nightingale et al. fails to meet the limitations of Claim 1. Since Claim 4-6 depend from Claim 1, these claims are not shown by Nightingale et al. either.

In view of the foregoing, Nightingale '256 fails to anticipate Claims 1, 4-6, as amended, under Section 102. Applicant submits that Claims 1, 4-6, are now allowable over the cited prior art.

V. **Rejection of Claims under Section 103(a)**

A. Claims 2-3 and 10 as being unpatentable over Nightingale et al. in view of Gammon

Claims 2, 3 and 10 have been canceled herein rendering this rejection moot. However, the limitations of Claims 2, 3 and 10 have been incorporated into independent Claim 1. Therefore, arguments are submitted below in connection with Claim 1 as it relates to Nightingale et al. and Gammon.

The office action states that Nightingale et al. teaches the claimed invention except for the thermally conductive material being a thermally conductive net-shaped injection moldable polymer composition. Gammon is cited for the teaching of a net-shape molded piece of polymer loaded with conductive filler. The office

action further states that it would be obvious for Nightingale et al. to employ the polymer piece of material of Gammon.

Nightingale et al. teaches a welded box of metallic plates. For example, the base plate 10 is ideally copper (Col. 3, lines 19-20) and the side wall bands may be made of stainless steel (Col. 3, lines 48-52). The materials are soldered or welded together. See generally Col. 3. The goal of the invention of Nightingale et al. is to provide an electrically and thermally conductive housing for an electronic component which is hermetically sealed to keep out contamination. The Nightingale et al. invention provides such a housing from cheaper flat metallic parts rather than using a more expensive unitary machine block of metal to provide the hermetically sealed housing.

In contrast, Gammon teaches an EMI (electromagnetic interference) shielding cover that snaps onto the surface of a circuit board to electromagnetically protect the components thereunder. The shield generally provides a barrier to EMI waves and may also have some incidental thermally conductive heat sinking effects. However, the shield of Gammon is merely a barrier to EMI and is not touching the electronic component which is protects. This is not surprising because the true purpose of the shield in Gammon is for EMI shielding which does not require that the housing touch the electronic component.

In contrast, Applicants' invention provides not only EMI shielding, as set forth in Claim 15, but also, and most importantly, provides a heat sink to remove heat generated by the electronic component. For optimum thermal dissipating, the heat sink member, in this case the housing, is optimally positioned to actually touch the object which it is intended to remove heat from. This is because air is not as good

as a conductor of heat as the optimized heat sink itself. Turning back to Gammon's shield, an air gap will be present between the shield and the electronic components sitting thereunder making it a poor pathway for heat. From the specification of Gammon, thermal conductivity is of little concern because the focus of Gammon is solve EMI shielding issues and radio frequency interference which does not require intimate touching contact between the shield and the electronic components.

Applicants' invention provides a thermally conductive housing which is far superior to the shield of Gammon because the housing actually touches the electronic component which it is intended to dissipate heat from. The ability of the housing to be injection molded, as set forth in the claims as amended, enable complex shapes to be formed into a unitary body, such as the connector shown in Fig. 1 of Applicants' invention. This connector could not be cost-effectively formed from a machined block of metal. Moreover, during the injection molding process, the flow and positioning of filler material within the housing body can be controlled and optimize, unlike raw metal. See co-owned U.S. Patent No. 6,139,783 by the Assignee herein.

Moreover, the metal welded or soldered box of Nightingale et al. houses a single electronic component while Gammon's shield is designed to snap into an existing circuit board to be positioned over a number of electronic components to shield them from EMI and radio interference. As a result, Gammon's shield is incompatible with Nightingale's welded metal box. The office action suggests that Nightingale would somehow want to make its outer housing box out of thermally conductive polymer rather than raw metal. Nightingale et al. teaches away from this suggested combination. Nightingale et al. states that the housing box needs to

have a thermal conductivity that exceeds 100 W/m°K to cool the high power laser diodes. See Col. 3, lines 25-30. This is not surprising because the goal of Nightingale et al. is to simulate a metal housing box of machined metal at lower cost while maintaining a hermetic seal. However, substituting a hermetically sealed metal housing box of Nightingale et al. with a much lower thermal conductivity filled plastic would prevent Nightingale et al from achieving the goals of that invention.

Therefore, Applicant submits that Nightingale et al. and Gammon are not combinable under Section 103.

Moreover, even assuming Nightingale et al. and Gammon are combinable under Section 103, that combination fails to teach Applicants' claimed invention, as amended. More specifically, as set forth in detail above, the prior art fails to teach an overmolded thermally conductive filled polymer that surrounds and touches the electronic component to be cooled for optimum thermal transfer. The overmolding of the thermally conductive polymer material of the present invention is the only way to truly achieve such a structure.

In view the foregoing, Claim 1, which incorporates the limitations of Claims 2-3 and 10, is patentable over the combination of Nightingale et al. and Gammon. Thus, Claim 4-6 and 8, which depend from now allowable Claim 1, are also submitted as being allowable over the cited prior art.

B. Claim 9 as being unpatentable over Nightingale et al.

Claim 9 has been canceled rendering moot the rejection thereof. It should be noted that the limitations of Claim 9 have been incorporated into now allowable Claim 1.

C. Claims 7-8 as being unpatentable over Nightingale et al. and Gammon and further in view of Baumberger et al.

Claim 7 has been canceled rendering moot the rejection thereof. It should be noted that the limitations of Claim 7 have been incorporated into now allowable Claim 1.

Claim 8, which depends from now allowable Claim 1, is now also submitted as being allowable over the cited prior art.

D. Claims 11 and 14-16 as being unpatentable over Berg et al. in view of Gammon

The office action states that Berg et al. teaches an electronic connector with an outer housing surrounding a heat generating component. However, Berg et al. does not teach that the housing is made from a thermally conductive polymer material which can also electromagnetically shield the electronic component therein. Gammon is cited for the general teaching of an EMI and radio frequency interference shield. The office action states that it would be obvious for Berg et al. to injection mold the housing from thermally conductive polymer material as taught in Gammon.

Berg et al. teaches an electronic connector which is substantially the same type of connector as in Fig. 1 of Applicants' invention which is an optical transceiver module. A typical transceiver housing has a bottom plastic half and a top plastic half. The bottom half carries a circuit board with components thereon. The circuit board can snap into or be affixed somehow, such as by gluing, friction-fit or welding, to the bottom half. A top half can snap onto the bottom half or be welded thereon to enclose the module. The top and bottom half is part of the construction and assembly of the module.

Gammon teaches an EMI and radio interference shield of thermally conductive polymer material. The office action suggests that Berg et al. would want to employ the thermally conductive polymer as its housing material. It is well known that the transceiver modules can be made of plastic or metal halves that mate together to form a completed module housing.

However, the method of the present invention goes further than the teaching of Berg et al. and Gammon. More specifically, the present invention not only provides an outer housing of thermally conductive filled plastic material but actually overmolds the thermally conductive material around the electronic component so the thermally conductive material actually touches the electronic component to be cooled and EMI shielded. It is well known that the process of overmolding an object means that the overmolding material actually touches the object.

Even assuming that Berg et al. and Gammon are combinable under Section 103, that combination fails to teach Applicants' invention, as amended. Even if Berg et al. were to employ a thermally conductive filled polymer as its housing material, it still would not be overmolded over the electronic components inside. This overmolding is critical to Applicants' invention because it is the intimate contact of the thermally conductive filled polymer with the electronic component that optimizes thermal transfer therefrom and shielding of EMI.

Therefore, the combination of Berg et al. and Gammon fails to meet the limitation of Claim 11, as amended. The rejection as to Claims 14 and 16 are moot in view of the cancellation of these claims. It should be noted that the limitations of Claims 14 and 16 have been incorporated into now allowable Claim 11.

In view the foregoing, Claim 11 is patentable over the combination of Berg et al. and Gammon.

E. Claims 12-13 as being unpatentable over Berg et al. and Gammon in view of Baumberger

Claim 12 has been canceled rendering moot the rejection thereof. It should be noted that the limitations of Claim 12 has been incorporated into now allowable Claim 11.

Claim 13, which depends from now allowable Claim 11, is now also submitted as being allowable over the cited prior art.

VI. Conclusion

Applicant submits that Claims 1, 4-6, 8, 11, 13 and 15, as amended, are allowable over the cited prior art. In view of the above, Applicants submit that pending Claims 1, 4-6, 8, 11, 13 and 15 are now in condition for allowance. Reconsideration of the Rejections and Objections are requested. Allowance of Claims 1, 4-6, 8, 11, 13 and 15 at an early date is solicited.

If any further fees are required in connection with the filing of this Amendment, the Office is authorized to charge Deposit Account 02-0900 for the appropriate additional fees in connection with the timely filing of this response.

The Examiner is invited to telephone the undersigned should any questions arise.

Respectfully submitted,

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